end). The twelfth transmembrane domain extends from about amino acid 481 (extracellular end) to about amino acid 499 (intracellular end).

Fig. 4 includes a series of plots predicting various structural features of GLUTX: alpha regions (Garnier-Robson), beta regions (Garnier-Robson), turn regions (Garnier-Robson), coil regions (Garnier-Robson), amphipathic alpha regions (Eisenberg), amphipathic beta regions (Eisenberg), and flexible regions (Karplus-Schulz). Fig. 4 also includes plots of antigenicity index (Jameson-Wolf), surface probability (Emini), and hydrophilicity (Kyte-Doolittle).

The predicted amino acid sequence of GLUTX was compared to the amino acid sequences of GLUT1, (SEQ ID NO:3), GLUT2 (SEQ ID NO:4), GLUT3 (SEQ ID NO:5), GLUT4 (SEQ ID NO:6), and GLUT5 (SEQ ID NO:7). This comparison is depicted in Fig. 3 along with a majority sequence (SEQ ID NO:8). As noted above, in designing variant forms of GLUTX which retain the activity of wild-type GLUTX, it is generally preferable to avoid altering residues that are highly conserved. Of course, if one wished to design a reduced activity variant of GLUTX, it is generally preferable to alter conserved residues. Using sequence comparison information one can design GLUTX variants which are more similar to GLUT1, (SEQ ID NO:3), GLUT2 (SEQ ID NO:4), GLUT3 (SEQ ID NO:5), GLUT4 (SEQ ID NO:6), or GLUT5 (SEQ ID NO:7).

Northern blot analysis carried out using a Clontech Inc. (Palo Alto, CA) blot revealed that GLUTX is expressed in the following tissues: liver, kidney, skeletal muscle, and prostate. GLUTX is weakly expressed in the following tissues: small intestine, bladder, placenta, and heart. Finally, this analysis revealed GLUTX expression is not

detectable in the following tissues: brain, lung, pancreas, uterus, colon, and stomach.

GLUTX cDNA was inserted into the mammalian expression vector pMET7 (a modified version of pME18S, which utilizes the SRa promoter as described previously; Takebe, *Mol. Cell Bio.* 8:466, 1988) to create a GLUTX expression vector.

The activity of GLUTX and variants thereof may be assessed using any suitable assay. For example, Keller *et al.* (*J. Biol. Chem.* 264:18884, 1989) describes an assay which can be used to measure the kinetic parameters of hexose transport.

XX. Deposit Statement

The clones described herein as _____ have been deposited with the American Type Culture Collection and assigned accession numbers _____, respectively.

The above-noted cultures have been deposited under conditions that assure that access to the cultures will be available during the pendency of the patent application to one determined by the Commissioner of Patents and Trademarks to be entitled thereto under 37 CFR 1.14 and 35 U.S.C. 122. The deposits are available as required by foreign patent laws in countries wherein counterparts of the subject application, or its progeny, are filed. However, it should be understood that the availability of a deposit does not constitute a license to practice the subject invention in derogation of patent rights granted by governmental action.

Further, the subject culture deposits will be stored and made available to the public in accord with the provisions of the Budapest Treaty for the Deposit of Microorganisms, *i.e.*, they will be stored with all the care necessary to keep them viable and uncontaminated for a period of at least five years after the most recent request

for the furnishing of a sample of the deposits, and in any case, for a period of at least 30 (thirty) years after the date of deposit or for the enforceable life of any patent which may issue disclosing the cultures plus five years after the last request for a sample from a deposit. The depositor acknowledges the duty to replace the deposits should the depository be unable to furnish a sample when requested, due to the condition of the deposits. All restrictions on the availability to the public of the subject culture deposits will be irrevocably removed upon the granting of a patent disclosing them.

What is claimed is: